

# Latvian national height system as EVRS realization

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# History of Latvian national height system

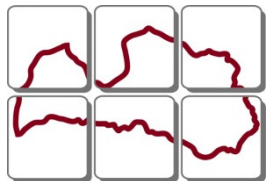
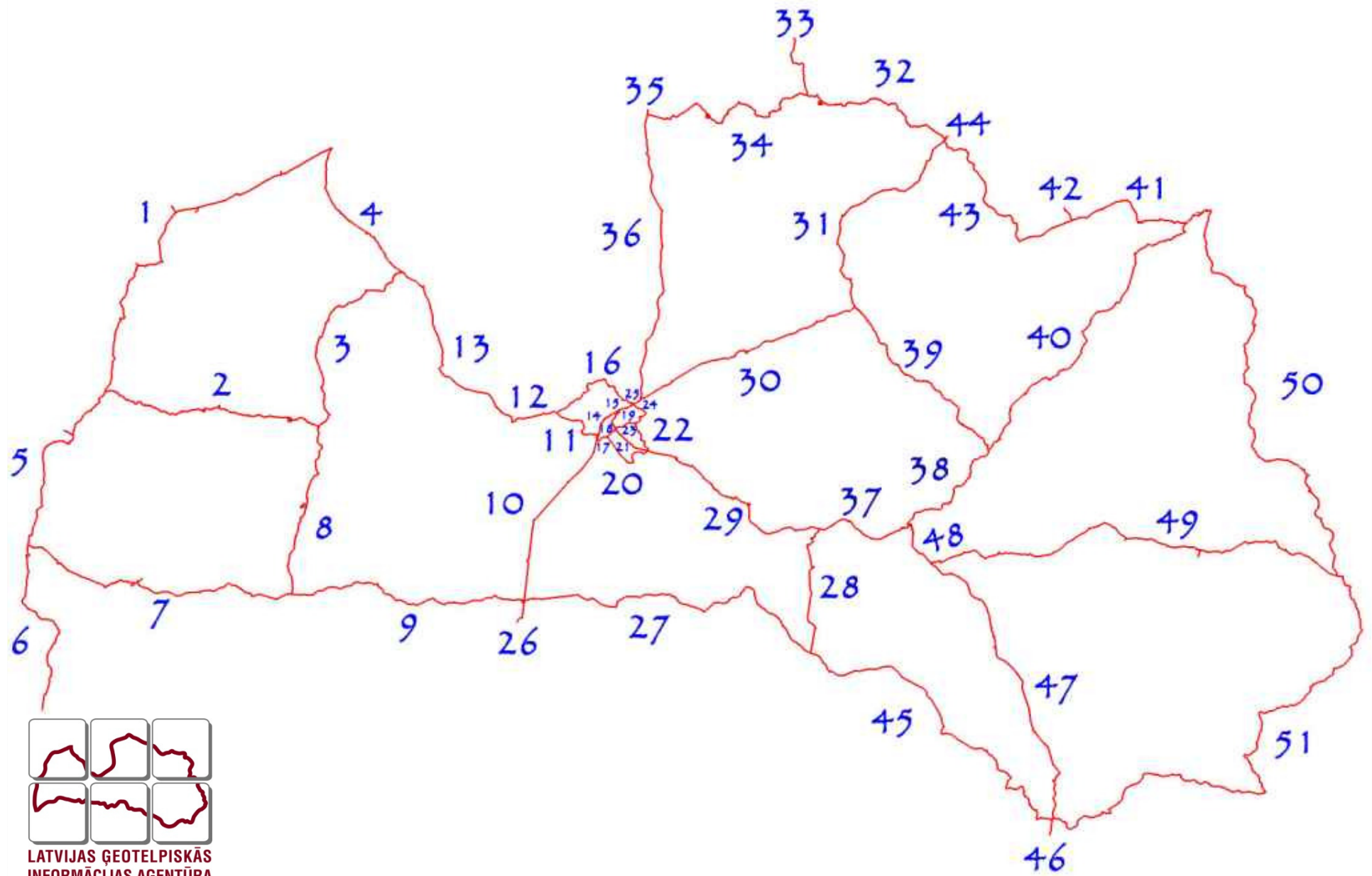
From years 1929 till 1939 First order levelling network was established.

Baltic sea as Zero datum.

At soviet time new First order levelling campaign was done. Latvian national network was qualified as Second order network. Zero datum Kronstade levelling rod in Blue bridge near St.Peterburg. Main adjustment done to epoch 1977.

From year 2000 till 2010 re-measurements of Latvian First order network. As much as possible used old Latvian and Soviet time network.

# 1. Order levelling network with connection to Lithuania and Estonia



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# European Vertical Reference system (EVRS)

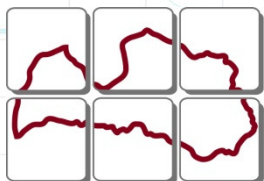
Developed and maintenance IAG sub commission 1.3.a for Europe EUREF

EUREF symposium 2000 in Tromso a first definition of EVRS.

UEN 95/98 solution got the name EVRF2000

EVRS latest realization is computed and published under name EVRF2007

Gravity related kinematic height system



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Strategy change height us  
less us possible



# EVRF2007

Geopotencial realization:

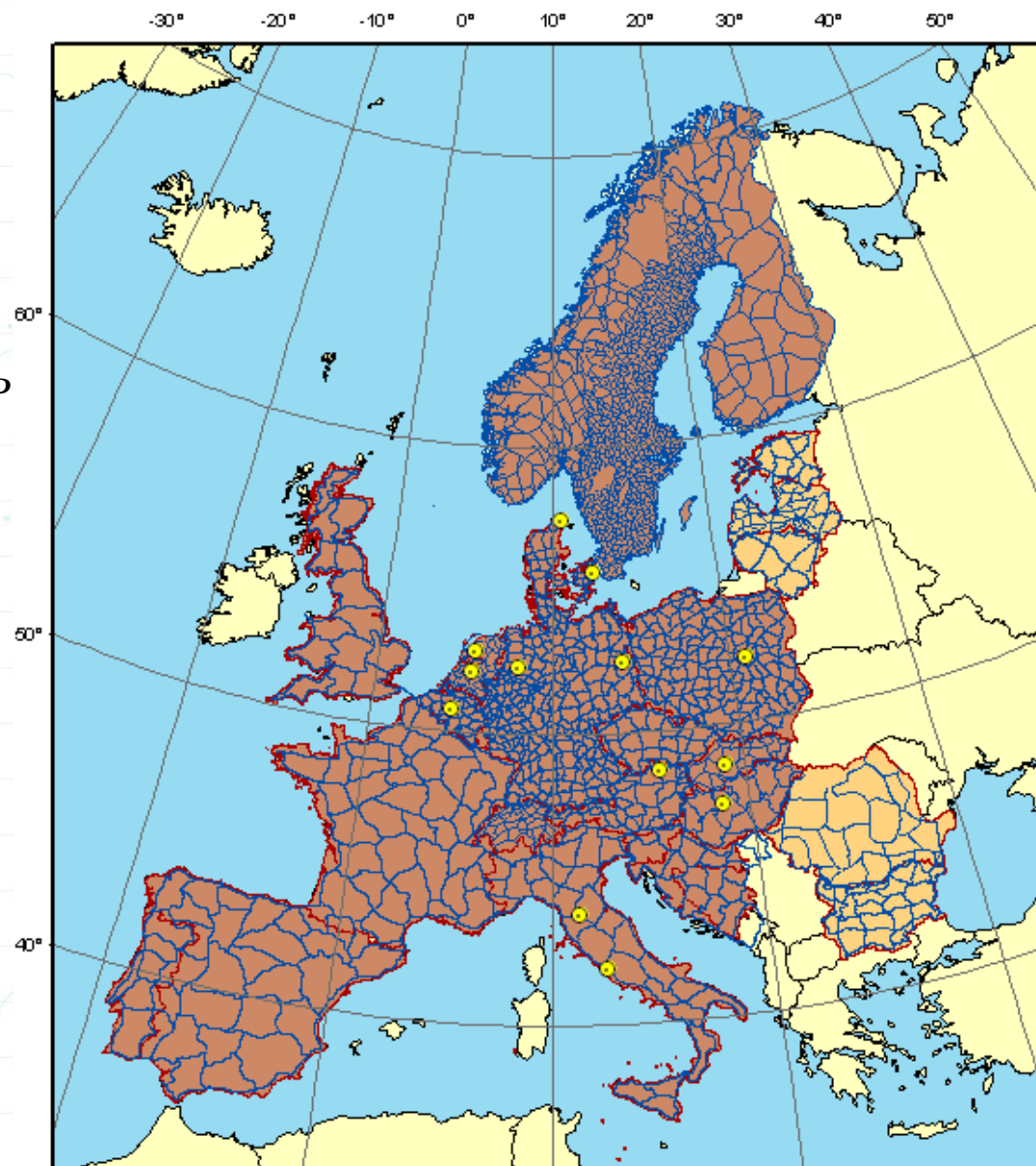
$$-\Delta W_P = C_P = W_{NAP}^{REAL} - W_P$$

EVRF2007 realization is done by 13 points

EVRF2007 epoch is 2000

Latvian levelling data is only in EVRF2007 realization

INSPIRE and EUROCONTROL encourage to use EVRS as height reference system for harmonization of height data.



*Extension of UELN*

- up to 1998
- as from 2003

- Datum points of EVRF2007
- UELN lines

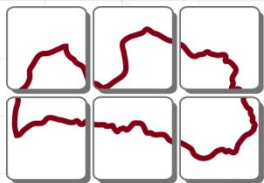


# How to implement national height system?

*On one hand is to established own zero point near seashore and start to count height from that.*

*On other hand used geodetically correct and scientifically maintenance system over all Europe:*

- no problems for cross border projects;*
- easy access for all geoinfomation users;*
- straight geodetic solution with local realization of system;*
- future development together with Europe.*



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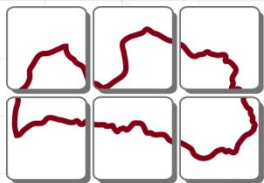


# Decision Latvian of geodesists

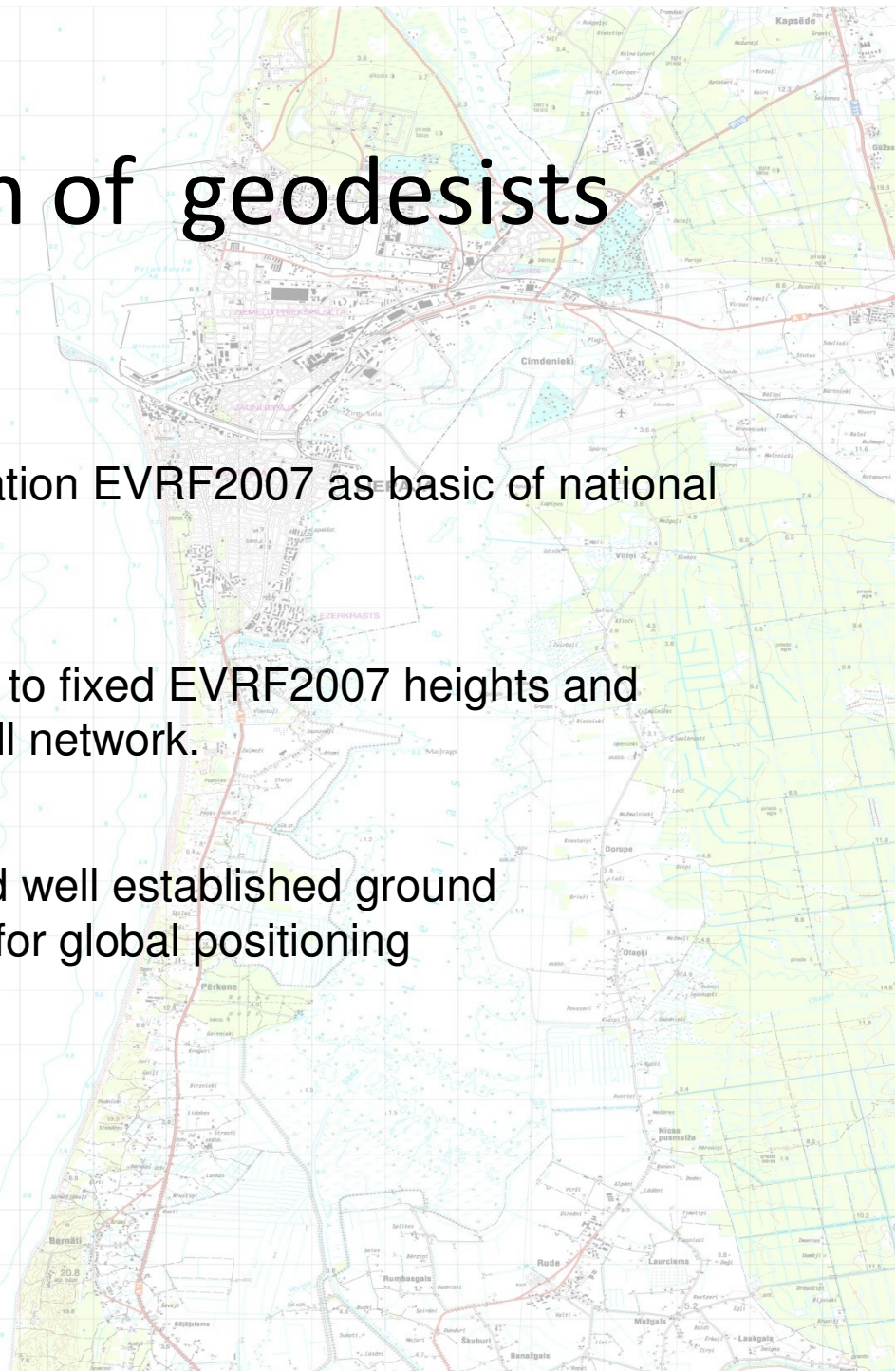
Latvian geodesists accept EVRS realization EVRF2007 as basic of national height system

In the territory of Latvia chose 16 points to fixed EVRF2007 heights and served as backbone for adjustment of all network.

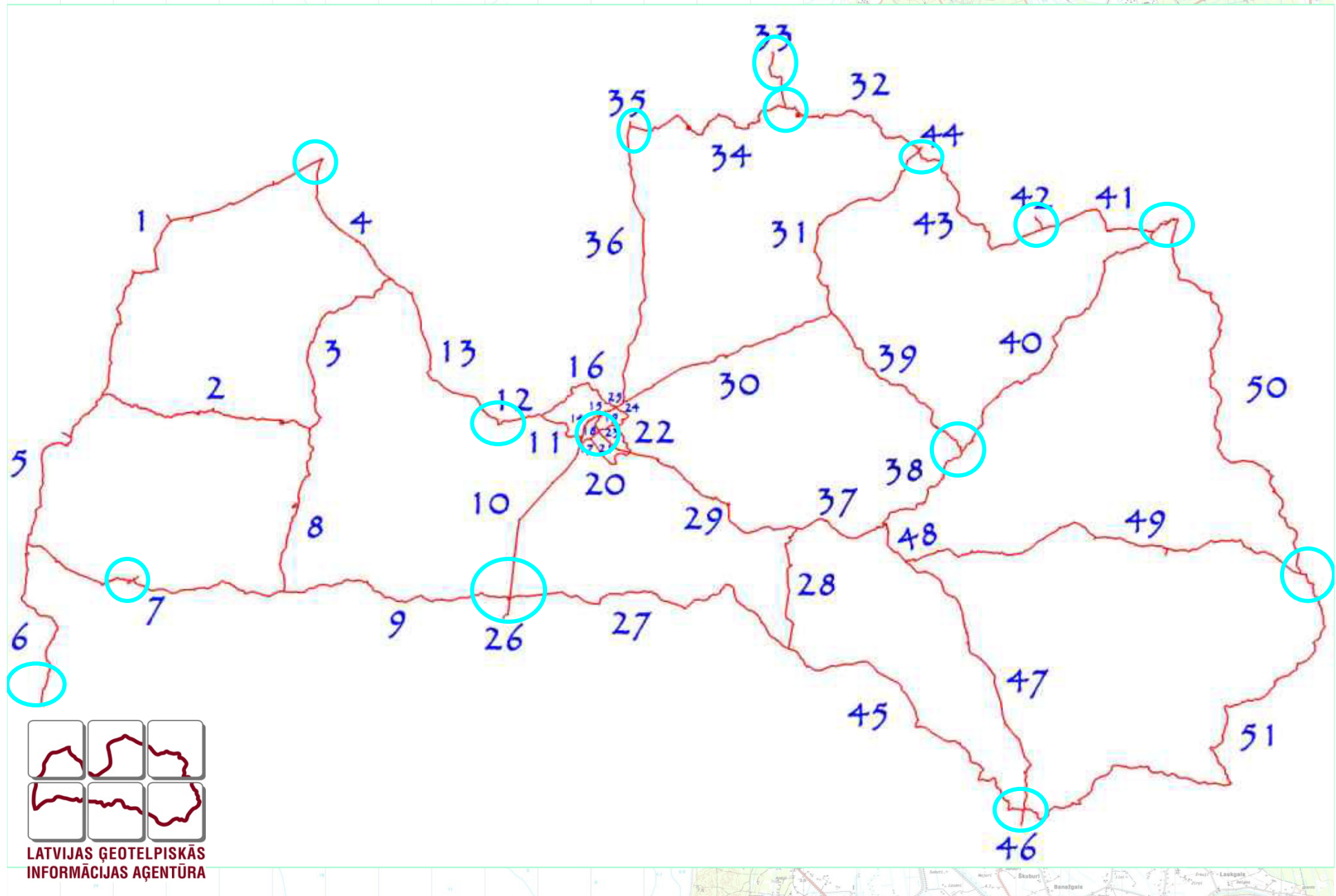
Fixed points are at least 20 year old and well established ground benchmark. Largest part with good sky for global positioning observation.



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# Distribution of 16 fixed points





# Adjustment of levelling network

1. Order levelling network is adjusted with least square method as straight as possible

Accuracy 0.6 mm per 1 km for all network.

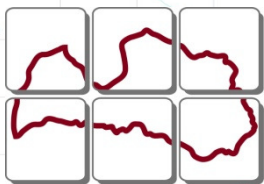
Maximal standard deviation of benchmark against fixed points is 4.40 mm

Mean around 2.00 mm

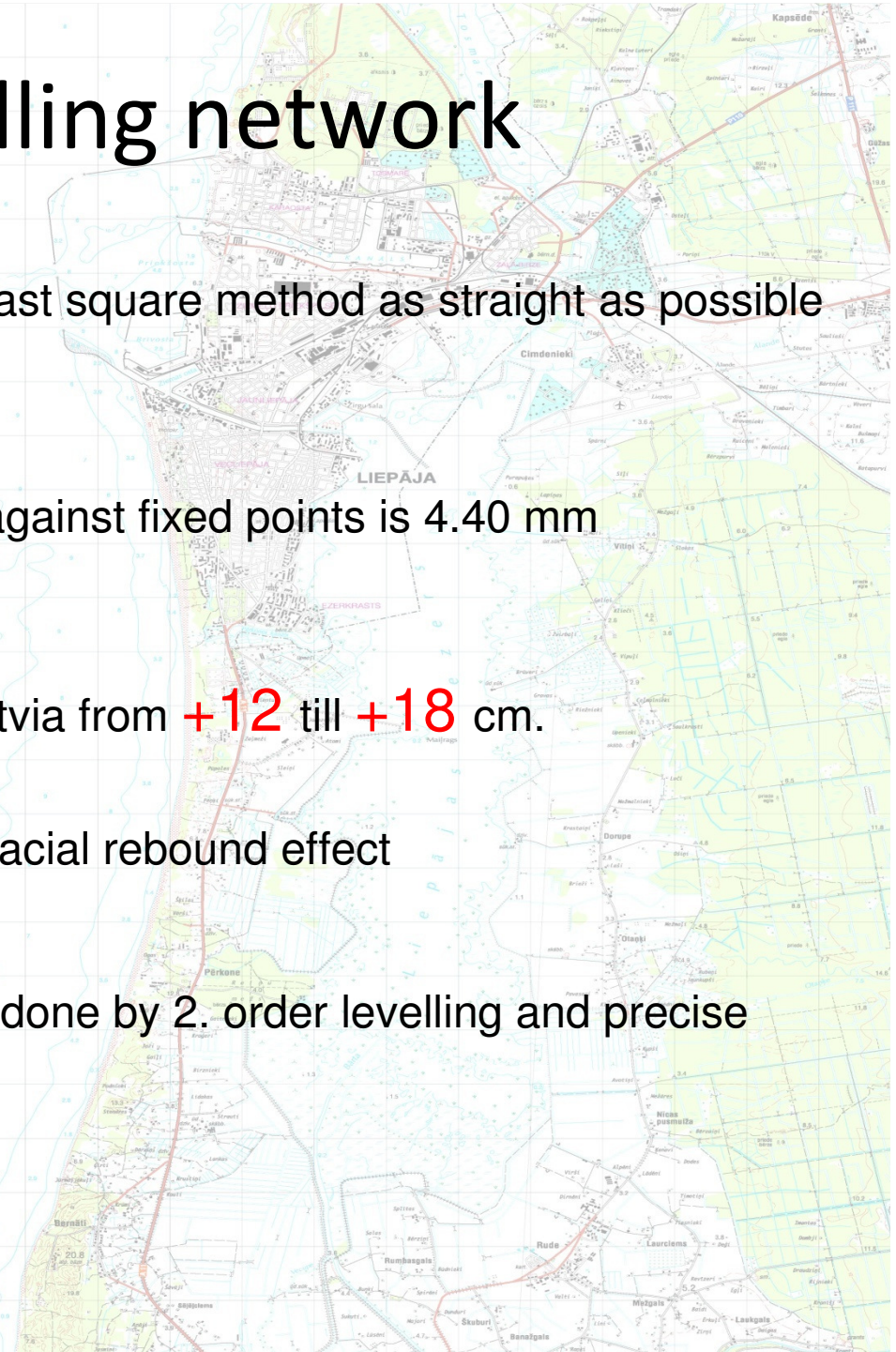
New height system will change height in Latvia from **+12** till **+18** cm.

Height change is not constant due to postglacial rebound effect in Northern part of Europe

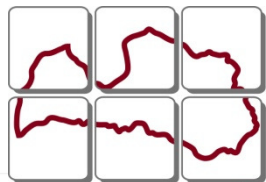
Further distribution of height system will be done by 2. order levelling and precise quasigeoid model.



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# Height values changes from BAS-77 to ERVF2007



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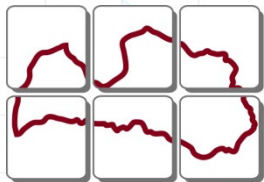




**THANK FOR YOUR ATTENTION!**

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